Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Modernizing the E-rate Program for Schools and Libraries	)	WC Docket No. 13-184
	)	

REPLY COMMENTS OF AMPLIFY EDUCATION, INC.

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Amplify Education, Inc. ("Amplify") submits these reply comments in response to the Notice of Proposed Rulemaking released by the Federal Communications Commission ("FCC" or "Commission") in the above-captioned proceeding seeking comment on proposals aimed at modernizing the schools and libraries universal service support mechanism ("E-rate").[1]

I. INTRODUCTION AND SUMMARY

As Amplify explained in its opening comments, it is not affiliated with a school or library and does not receive any money from the E-rate Fund. Amplify is interested in ensuring that schools have the bandwidth they need to make full use of the digital learning tools offered by Amplify and other providers of educational products and services. Thus, Amplify's interests are aligned with the core purpose of the E-rate program: "ensuring [that] schools and libraries have the connectivity necessary to enable students . . . to participate in the digital world."[2]

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[1] *Modernizing the E-rate Program for Schools and Libraries*, Notice of Proposed Rulemaking, 28 FCC Rcd 11304 (2013) (FCC 13-100) ("*NPRM*").

[2] *Id*. ¶ 2; *see also id.* ¶ 12 (proposing that a core goal of the E-rate program is "[e]nsuring [that] schools and libraries have affordable access to 21st Century broadband that supports digital learning").

With this core purpose in mind, Amplify continues to urge the Commission to adopt a minimum bandwidth target of 250 kbps per student for all schools supported by E-rate funds. Amplify's position is consistent with many of the comments filed in this proceeding favoring the establishment of a target bandwidth.[3] Amplify's proposal also falls squarely in the middle of the range of targets suggested by parties in the record.[4] Moreover, as explained below, and in the attached declaration of David Gestrich, 250 kbps per student is a reasonable estimate of the minimum bandwidth needed to allow schools to take advantage of the one-to-one digital learning tools that are an increasingly important part of American education. This estimate is based on evidence gathered in field trials conducted by Amplify and others, market research, and independent analysis conducted by Dr. Gestrich.[5]

In addition to setting a bandwidth target, the Commission can help schools obtain the bandwidth they need by eliminating the existing distinction between priority 1 and priority 2 services. As many parties recognize, the current priority system creates inefficiencies and effectively prevents schools from directing the necessary bandwidth to individual students throughout the school. Finally, Amplify agrees with those commenters that have noted the

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[3] *See, e.g.*, Reply Comments of the Bill and Melinda Gates Foundation, WC Docket No. 13-184, at 4 (Oct. 24, 2013) ("Gates Foundation Reply Comments"). Amplify's position is also consistent with the National Broadband Plan's recommendation that the FCC should "set goals for minimum broadband connectivity for schools and libraries." FCC, *Connecting America: The National Broadband Plan*," at 227, 236 (rel. March 16, 2010), http://download.broadband.gov/plan/national-broadband-plan.pdf ("National Broadband Plan").

[4] *See, e.g.*, Comments of EducationSuperHighway at 5-6 (supporting a near term goal of 100 kbps/student) ("EducationSuperHighway Comments"); Comments of Cisco Systems, Inc. at 16 (suggesting 0.5 Mbps/student) ("Cisco Comments"). (Unless otherwise indicated, all comments cited herein were filed in WC Docket No. 13-184 on September 16, 2013.)

[5] *See* attached Declaration of David A. Gestrich, ¶ 10 (Nov. 8, 2013) ("Gestrich Decl.").

benefits of allowing out-of-school access to E-rate funded services. Off-campus use of such services can be essential to meeting the educational needs of students, particularly those who do not have access to broadband in their homes.[6]

II. DISCUSSION

A. The Commission Should Adopt a Target Bandwidth of at Least 250 kbps per Student

Many parties joined Amplify in supporting the adoption of a bandwidth target for all schools,[7] although there was a range of proposed targets. For example, several other commenters supported the SETDA target of 100 kbps/student, going to 1 Gbps/student by 2017, while others argued for targets of approximately 500 kbps per student by 2014, increasing to approximately 2 Mbps per student by 2018.[8] Amplify continues to support a number in the middle of this range, favoring a target of at least 250 kbps per student.

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[6] *See* National Broadband Plan at 239 ("E-rate should support online learning by providing wireless connectivity to portable learning devices so students can engage in learning while not at school.").

[7] *See, e.g.*, Comments of Amplify Education, Inc. at 7-8 ("Amplify Comments"); Cisco Comments at 16-17; Comments of the Leading Education by Advancing Digital Commission at 10 ("LEAD Comments"), and attachment, *Paving a Path Forward for Digital Learning in the United States*, at 2 ("LEAD Report"); Comments of Hewlett-Packard Company at 9 ("Hewlett-Packard Comments"); Comments of AT&T Inc. at 1-2 ("AT&T Comments"); Comments of McGraw-Hill Education at 6-8 ("McGraw-Hill Comments"); Comments of Verizon and Verizon Wireless at 8-9 ("Verizon Comments"); *see also* Gates Foundation Reply Comments at 4 (urging the FCC to adopt "[c]lear, ambitious, and achievable connectivity goals").

[8] *Compare, e.g.*, EducationSuperHighway Comments at 5-6 (noting that in the near term, each school needs to be able to provide at least 100 kbps/student or staff member, with the bandwidth growing significantly over time) *with* McGraw-Hill Comments at 7 (challenging the FCC to meet goals of 1 Gbps per 2000 students by 2014 and 4 Gbps per 2000 students by 2018); *see also* Hewlett-Packard Comments at 9 (arguing for at least 1 Gbps per 100 students).

As Dr. David Gestrich, Amplify's Vice President of Technology Services, explains in his attached declaration, school districts will need to provide an average of at least 250 kbps per student if schools are to take full advantage of the digital and online educational resources available today and in the near future.[9] Considerable evidence, including Dr. Gestrich's independent assessment, and field trials conducted by Amplify, Apple Inc., and others, support the target of 250 kbps per student.[10] In addition, Dr. Gestrich has examined market reports and data from school IT managers and developed "bottom-up" models based on the bandwidth demands of specific applications that are commonly used in digital education.[11] All of these data points and analyses indicate that schools will need at least 250 kbps per student in order to support digital learning.[12]

As Dr. Gestrich notes, students may need even more bandwidth over the next few years.[13] Cisco, for example, anticipates that schools will need 500 kbps per student in 2014, increasing to 2 Mbps per student by 2018.[14] Thus, Amplify's estimate represents only the minimum target. In

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9 Gestrich Decl. ¶ 1.

10 *Id*. ¶¶ 3-9.

11 *Id*. ¶¶ 8-9.

12 *Id*. ¶ 10.

13 *Id*. ¶¶ 5, 7 (noting that bandwidth demand is likely to increase over time as new and improved applications are introduced and as students incorporate more Internet-based sites and resources into their education); Cisco Comments at 16-17; McGraw-Hill Comments at 7.

14 Cisco Comments at 16.

practice, the FCC should encourage schools to deploy networks capable of delivering far greater bandwidth to students and faculty throughout school buildings.[15]

Although some parties argue against uniform connectivity targets,[16] their arguments are unpersuasive. Neither geography nor school size should have any impact on the amount of bandwidth students need to take full advantage of digital learning tools.[17] Bandwidth needs are determined by the devices and applications being used in the school and by the resources and websites students need to access via the Internet. These demands are unaffected by the location of a school or the population of a school district. Thus, the Commission should adopt a single bandwidth target for all schools to ensure that all students nationwide have adequate access to digital learning tools. Otherwise, the Commission risks leaving certain students and schools behind while others advance with one-to-one digital education.

B. The Commission Should Eliminate the Distinctions Between Priority 1 and Priority 2 Services

There is widespread support in the record for modifying the E-rate rules to allow for increased funding for internal connections.[18] Although some parties supported SECA's proposal

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[15] *See* Comments of Internet2 at 11-13 (arguing that whatever performance goals the FCC adopts it should ensure that the E-rate program does not "shoot for the floor"; instead the FCC should encourage a "race to the top") ("Internet2 Comments").

[16] *See, e.g.*, Comments of the National Cable & Telecommunications Association at 6-7 (arguing against "one-size-fits-all" bandwidth targets) ("NCTA Comments"); Comments of Funds For Learning, LLC, at 53-55 ("FFL Comments").

[17] *See, e.g.,* Comments of the American Library Association at 4 (arguing that the FCC should adopt bandwidth targets that account for local differences) ("ALA Comments").

[18] *See, e.g.*, AT&T Comments at 3-4 (urging the FCC to prioritize funding to schools that have inadequate internal connections); Comments of Cox Communications, Inc. at 9 ("Cox Comments"); McGraw-Hill Comments at 9; Comments of Education Network of America at 26 ("ENA Comments").

to adjust the current rules governing priority 2 connections to allow more schools to receive funding for routers, switches, wireless access points and internal cabling,[19] the better answer is to eliminate the distinction between priority 1 and priority 2 services.[20] As Cisco notes, the priority system is counter-productive and "makes it impossible for most schools and libraries to provision digital learning devices."[21] Indeed, the current regime encourages schools to focus on priority 1 purchases, regardless of their actual needs.[22] As a result, the emphasis on priority 1 services has the perverse effect of preventing schools from deploying the internal connections they need to provide effective Internet access to their students. It also leads to the misallocation of E-rate resources as schools apply for services they do not really need to take advantage of funding available for priority 1 services.[23]

The Commission should eliminate the priority system. It should replace it with rules that give schools flexibility to focus holistically on investments that provide students with the

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[19] *See, e.g.,* Comments of the State E-rate Coordinators' Alliance at 12-13 ("SECA Comments"); Comments of CenturyLink at 11 ("CenturyLink Comments"); Verizon Comments at 17; Cox Comments at 9-10.

[20] *See, e.g.*, Amplify Comments at 9-11; NCTA Comments at 14; Cisco Comments at 6-7; Comments of the Miami-Dade County Public Schools at 10 (Sept. 11, 2013) ("Miami-Dade Comments"); Hewlett-Packard Comments at 14-15; Comments of Comcast Corporation at 21-23 ("Comcast Comments"); Comments of Qualcomm Incorporated at 13 ("Qualcomm Comments"); Comments of the Minority Media & Telecommunications Council, *et al*., at 5, 15-17 ("MMTC Comments").

[21] Cisco Comments at 6.

[22] FFL Comments at 9; Cisco Comments at 7 ("Cisco has seen first-hand how the current priority system leads educators to structure their funding requests (and, ultimately, their purchasing decisions) in inefficient ways . . .").

[23] FFL Comments at 9.

bandwidth they need in classrooms.[24] As Cisco has explained, an effective funding model must recognize the need for end-to-end networks that deliver broadband not only to the school building, but to the classroom and individual students' devices.[25] Under the current approach, schools might be able to buy a sufficiently robust connection to the Internet, but have no way to distribute that bandwidth to students and faculty throughout the school building. This is the E-rate equivalent of the "bridge to nowhere."

If all eligible services are treated the same for E-rate purposes, schools will be able to choose those services that best meet their needs, without regard to which are more likely to qualify for funding.[26] Abolishing the artificial distinction between various network elements, in conjunction with adopting a minimum bandwidth target per student, will help ensure that schools have access to the bandwidth needed to implement a digitally-based one-to-one learning curriculum.[27] Eliminating the distinction between priority 1 and priority 2 services would have the added benefit of improving the predictability of E-rate funding, and discouraging applications for services that are not essential to delivering bandwidth to the classroom.[28] Amplify therefore encourages the Commission to eliminate the funding differences between

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[24] *See* Amplify Comments at 9-11; Cisco Comments at 6-7 (urging the FCC to focus on a "whole network" funding model).

[25] *See* Cisco Comments at 7-8.

[26] Qualcomm Comments at 13.

[27] As Amplify explained in its initial comments, it favors providing schools with the flexibility to design and deploy internal networks that are responsive to their unique circumstances. Thus, Amplify would not support any rule mandating a particular network architecture for the delivery of high-capacity broadband within schools. *See* Amplify Comments at 9.

[28] MMTC Comments at 5, 16-17; Cisco Comments at 7-8.

various services and allow schools to establish their own priorities as they seek the end-to-end connectivity required to meet today's educational needs.

C. The Commission Should Allow Off-Campus Access to E-rate Supported Services

Amplify agrees with those commenters that support modifying the E-rate rules to allow for off-campus use of E-rate funded services. As CTIA pointed out, off-campus use of mobile broadband is consistent with the recommendations of the National Broadband Plan.[29] Allowing off-campus use would facilitate students' ability to learn outside of school,[30] and have the ancillary benefit of narrowing the existing gap in broadband access.[31] Any concerns about the potential impact on the E-rate Fund can be addressed by prohibiting schools from requesting funding for more services than are necessary to serve the educational needs of their current student populations.[32] Security or other concerns can be addressed by the schools and their vendors when they set up their networks.[33] If implemented properly, off-campus use could provide significant benefits to students and to the communities being served by the local schools without imposing a material cost on the schools or the E-rate program.

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[29] Comments of the CTIA – The Wireless Association® at 8 ("CTIA Comments"); National Broadband Plan at 239.

[30] *See, e.g.,* National Broadband Plan at 226 (explaining that broadband access allows students and teachers to "expand instruction beyond the confines of the physical classroom and traditional school day").

[31] *See, e.g.*, McGraw-Hill at 12; Leadership Conference at 2; Qualcomm at 5-6; Sprint at 10-11; SETDA at 19; SECA at 51.

[32] *See NPRM* ¶ 322. The Commission also could impose rules restricting off-campus use during school hours. Such rules will safeguard against the possibility that off-campus use of the network will affect the bandwidth available to students during the school day.

[33] *See* Cisco Comments at Exhibit A, "High-Speed Broadband in Every Classroom: The Promise of Modernized E-Rate Program," at 32 ("Cisco White Paper").

III. CONCLUSION

For the reasons described above, Amplify urges the Commission to adopt a target bandwidth of at least 250 kbps; eliminate the distinction between priority 1 and priority 2 services; and allow for off-campus use of E-rate-supported networks.

Respectfully submitted,

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Certificate of Service

I hereby certify that on this 8th day of November, 2013, I caused true and correct copies of the foregoing Reply Comments to be mailed by electronic mail to:

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ATTACHMENT

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DECLARATION OF DAVID A. GESTRICH

1. My name is David A. Gestrich and I am Vice President of Technology Services for Amplify Learning ("Amplify"), a division of Amplify Education, Inc. and its parent, News Corporation. The purpose of this declaration is to explain Amplify's recommendation that school districts provide an average of at least 250 kbps of bandwidth per student so that they can take full advantage of the digital and online educational resources available today and in the near future.

2. I have been with Amplify for six months and, for the past three years, I have been involved in the launch of major new business initiatives within News Corporation, including tablet-based applications for digital publishing (*e.g.,* The Daily) and digital publishing platforms (*e.g.,* Alesia). Prior to joining News Corporation, I held product development leadership roles in the telecommunications, billing services, data processing services, and consulting services industries, including 15 years developing network testing devices and operations systems used extensively by the major U.S. communications carriers to analyze the quality of their voice and digital services. I graduated *summa cum laude* from Indiana University of Pennsylvania in 1978 with a Bachelors of Science degree in Physics. In 1983, I completed my Ph.D. in Physics at Duke University.

3. As Vice President of Technology Services for Amplify, I am responsible for managing the Flip the Switch initiative, which establishes network reference models for K-12 schools to use as they prepare for the ubiquitous presence of 1:1 devices.[1] These models recommend standard network architectures, operational practices, and estimated network demand for individual schools. To develop the models, I analyze data gathered from field trials that Amplify and others have conducted to study the use of 1:1 devices in elementary and secondary schools of varying sizes across the United States. I then use that information to develop requirements that schools and non-profits can use to anticipate the network bandwidth needed for 1:1 learning.
4. To develop an initial demand estimate, I analyzed market reports and submissions from carriers and school IT managers regarding the bandwidth that is required to run each type of application typically used in schools. Based on this analysis, I concluded that school districts currently require an average of 250 kbps per student to meet their 1:1 device learning needs.
5. Amplify has also conducted field trials for small (one to two classrooms) and large (full school) settings. While average throughput varied depending on a number of factors – including the curriculum used in each school/classroom – bandwidth demand ranged up to 160 kbps per student during these trials. There are numerous reasons to believe that this number underestimates the bandwidth required to support a school that is fully dedicated to 1:1 digital learning, however. For example, the trials did not include any periods during which the schools were conducting assessments. Nor did Amplify's trials include high school students, who typically demand more bandwidth than students in lower grades due to

[1] "1:1 devices" refers to electronic devices, such as netbooks, laptops, Amplify's tablets, or Apple's iPads that schools distribute to students and faculty to facilitate one-to-one learning.

the more complex nature of their assignments and the wider range of applications and information sources suitable for their age. The trials were also skewed by the fact that they included specific courseware and were conducted in a hybrid environment, involving a combination of digital and non-digital (*e.g.,* printed) materials. In an all-digital classroom, there would be a greater reliance on 1:1 devices and higher bandwidth demand. Further, most of the 1:1 materials used during Amplify's field tests were pre-loaded onto each user's device to minimize bandwidth needs. Amplify reduced bandwidth demand even more by blocking or restricting access to certain sites and content. Real-world usage, therefore, is likely to require significantly more bandwidth than the averages reflected in Amplify's trials, particularly during periods of peak usage. After adjusting for the factors that limited demand, the results of the trials are consistent with Amplify's estimates that digital learning will require schools to provide at least 250 kbps of bandwidth per student, on average. This is especially true given that bandwidth demand is likely to grow over time. Good engineering and network practices dictate that schools design their networks to accommodate this growth. Otherwise, the network may become obsolete almost as soon as it is installed.

6. Amplify's target bandwidth is also supported by the results of trials that Apple Inc. ("Apple") has conducted in Texas high schools. Those trials involved broader device deployment and less restrictive curriculum controls than those used in Amplify's trials. Nonetheless, Apple appears to have taken reasonable measures to ensure that the devices in its trials were used only for educational purposes: For example, my understanding is that, during the trials, Apple restricted students' access to social media and other non-educational content. Even with these restrictions in place, school bandwidth demand reached 5 Gbps bursts and 0.5 Gbps averages during peak usage periods for schools of roughly 2000 students. Thus, the

anecdotal evidence from these trials supports Amplify's estimates that a 1:1 digital learning curriculum demands throughput of 250 kbps per student.

7. As noted above, I believe that bandwidth demand is likely to grow over time. Specifically, I expect that the amount of bandwidth needed to support digital learning will increase as students and teachers become more comfortable using their 1:1 devices and as they continue to gain access to new applications and information sources. This expected increase in bandwidth demand is consistent with the more general trend in Internet usage in the United States. For example, a recent Sandvine Report projects continued growth in both home and mobile Internet access over the next five years.[2]

8. In addition to reviewing the data from market research and field trials, I have also modified a planning tool developed by the Partnership for Assessment of Readiness for College and Careers ("PARCC") to anticipate the growing use of various media and curriculum in the classroom over time. The modified tool is designed to provide an initial estimate of a school network's utilization when every student and teacher connects to the network with individual smart devices (*e.g.*, smart phones or tablets). It also provides a starting point for schools to determine the bandwidth they will need to accommodate the deployment of 1:1 learning devices. The initial estimates generated by the planning tool can be verified by Amplify's Flip the Switch field trials.

9. I have shared this tool with a group of school Chief Information Officers ("CIOs") to see how it models the evolution of their network demands as more types of 1:1 applications are used, from email to Skype to video streaming sessions. The CIOs have used the planning tool to generate load expectations for their own network designs, and they have indicated that

[2] Sandvine Report, "Global Internet Phenomena Report, 1H2013," pp. 5-10, 19.

the tool helps them accurately predict their network needs. The planning tool suggests that, when all students and staff are equipped with smart devices, and a range of activities are running simultaneously in classrooms and offices, a school district's average use is likely to be approximately 250 kbps/student. This projection is consistent with Amplify's recommendation that schools target an average load of 250 kbps/student for future 1:1 implementations.

10. Finally, I note that Amplify's estimates may be conservative given other forecasts of the bandwidth that will be needed to support digital learning. Cisco, for example, anticipates that demand for Internet access will reach 500 kbps per student as soon as 2014 and will increase to as much as 2 Mbps per student by 2018. Cisco's estimates are based on its analysis of school 1:1 implementations on Cisco monitored networks.[3] These Cisco estimates, combined with Apple's trials, Amplify's trials, and my own analysis – conducted in conjunction with school IT professionals – all support Amplify's position that the FCC should establish a bandwidth target of at least 250 kbps per student for all schools nationwide.

11. This concludes my declaration.

[3] Cisco Whitepaper, "High-Speed Broadband in Every Classroom: The Promise of a Modernized E-Rate Program," September 2013.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on November 8, 2013.

David A. Gestrich